



# **DECARBONISED HABITAT ASSESSMENT & RATING FOR TRANSITION INITIATIVES- LINEAR INFRASTRUCTURE (DHARTI-LI 1.0)**

**BUILDING SUSTAINABLE TRANSPORTATION PROJECTS**

***ABRIDGED MANUAL***

**VERSION 1.0 | 2026**

# PREPARED BY

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## DHARTI

DHARTI is a structured and comprehensive **rating council** developed to assess, guide, and accelerate sustainability performance across projects, organisations, and built environments. Anchored in the principles of environmental responsibility, social inclusion, and governance excellence, DHARTI provides a credible and consistent benchmark for evaluating real-world sustainability outcomes and long-term resilience.

The DHARTI Rating Council is designed to move beyond intent-based commitments and standalone disclosures, placing emphasis on **measurable performance, verifiable evidence, and continuous improvement**. It enables stakeholders to clearly understand their current sustainability performance while offering a structured pathway for progression aligned with national priorities, global best practices, and evolving regulatory and market expectations. Using a systematic, point-based, and performance-driven methodology, the DHARTI Rating Council evaluates key sustainability dimensions such as resource efficiency, climate responsiveness, environmental management, social value creation, and institutional governance. Sustainability objectives are translated into clear and comparable performance criteria, supporting transparent assessment across the project lifecycle from planning and design to implementation and long-term operation. Through mandatory requirements and graded benchmarks, the DHARTI Rating promotes accountability, informed decision-making, and progressive enhancement of sustainability outcomes.

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# What is the Decarbonised Habitat Assessment & Rating for Transition Initiatives – Linear Infrastructure (DHARTI-LI 1.0), Rating System?

DHARTI & GT Global have conceptualized a technical framework for Decarbonised Habitat Assessment & Rating for Transition Initiatives - Linear Infrastructure (DHARTI-LI 1.0), rating system. Together, these institutions endorse the **Decarbonised Habitat Assessment & Rating for Transition Initiatives - Linear Infrastructure (DHARTI-LI 1.0), Rating System** – India as a robust, credible, and standardized framework for measuring and certifying the sustainability performance of Linear Infrastructure projects, particularly in the transportation sector.

The rating system is based on a comprehensive point-based evaluation methodology that enables objective assessment and benchmarking of sustainability outcomes. There are ten core sustainability component areas, identified for ensuring a balanced evaluation of environmental responsibility, resource efficiency, social impact, and long-term infrastructure resilience across all modes of transportation.

S. No.	Impact Category	Alignment with UN Sustainable Development Goals (SDGs)	Points
1.	Materials & Resources	SDGs: 13, 12, & 9	16
2.	Energy & Carbon Emissions	SDGs: 13 & 7	16
3.	Land Use, Ecology & Biodiversity	SDGs: 15	14
4.	Water Management	SDGs: 6 & 11	8
5.	Waste Management	SDGs: 12 & 3	8
6.	Air Quality, Noise & Vibration	SDGs: 3 & 11	9
7.	Health, Safety & Well-Being	SDGs: 8 & 11	7
8.	Community & Social Impact	SDGs: 10, 11, & 16	7
9.	Resilience & Climate Adaptation	SDGs: 9, 11, & 13	10
10.	Economic Sustainability & Lifecycle Value	SDGs: 8, 9, 11, 12, & 17	5
<b>Total</b>			<b>100</b>
11	Innovation	-	100 + 10
<b>Grand Total</b>			<b>110</b>

**Note:** Under the DHARTI-LI 1.0 framework, all credits are aligned with the **United Nations Sustainable Development Goals (SDGs)** to ensure global relevance and consistency with internationally recognized sustainability objectives. For a comprehensive understanding of how each credit and sub-credit corresponds to specific SDGs, including detailed explanations of the alignment, please refer to the Appendix section of this manual.

## Importance of the Decarbonised Habitat Assessment & Rating for Transition Initiatives – Linear Infrastructure (DHARTI-LI 1.0), Rating System for Sustainable Development

- The **Decarbonised Habitat Assessment & Rating for Transition Initiatives – Linear Infrastructure (DHARTI-LI 1.0), Rating System** offers a standardized, measurable framework to assess sustainability across the project lifecycle, from planning to maintenance.
- It encourages responsible resource use, reduces carbon emissions, and minimizes environmental impacts like habitat loss, pollution, and resource depletion.
- The system aligns with India’s national climate goals, including Net Zero by 2070 and Viksit Bharat by 2047, supporting long-term resilience and low-carbon development.
- It drives efficiency and accountability among developers, contractors, and policymakers, fostering innovation and best practices in infrastructure projects.
- By integrating sustainability benchmarks, the rating system helps mitigate ecological and social risks, enhances climate resilience, and promotes broader adoption of sustainable practices across infrastructure sectors.

## ABBREVIATION

<b>DHARTI</b>	Decarbonised Habitat Assessment & Rating for Transition Initiatives
<b>DHARTI-LI</b>	Decarbonised Habitat Assessment & Rating for Transition Initiatives – Linear Infrastructure
<b>GGBS</b>	Ground Granulated Blast Furnace Slag
<b>RAP</b>	Recycled Asphalt Pavement
<b>GHG</b>	Green House Gas
<b>ROW</b>	Right of Way
<b>PPE</b>	Personal Protective Equipment
<b>MoHUA</b>	Ministry of Housing and Urban Affairs
<b>CEAI</b>	Consulting Engineers Association of India
<b>C&amp;D</b>	Construction & Demolition
<b>ISO</b>	International Organization for Standardization
<b>EMS</b>	Environmental Management System
<b>MSDS</b>	Material Safety Data Sheets
<b>SOP</b>	Standard Operating Procedure
<b>SDGs</b>	Sustainable Development Goals
<b>MSME</b>	Micro, Small and Medium Enterprises
<b>SME</b>	Small and Medium Enterprises
<b>ESG</b>	Environmental, Social, and Governance
<b>O&amp;M</b>	Operation and Maintenance
<b>*</b>	Mandatory Credit
<b>**</b>	To be confirmed

## OVERVIEW

Linear infrastructure - such as highways, expressways, roads, rails, bridges, flyovers, Runways, tunnels, Pipelines, Transmission Lines, Canals, etc. is essential for India's economic growth, regional connectivity, and social development, but its construction and maintenance contribute significantly to environmental degradation, if sustainability aspects are not taken into account. Infrastructure projects account for a substantial share of India's embodied carbon emissions, with the construction sector responsible for a notable portion of the country's remaining carbon budget and infrastructure-related emissions estimated at 20-25% of total national emissions. India vast road network alone consumes approximately 1.2 billion tonnes of natural aggregates annually, exacerbating resource depletion and environmental stress. These impacts are further compounded by deforestation, biodiversity loss, soil erosion, and air pollution, endangering long-term climate resilience and sustainability.

To address these challenges, **Decarbonised Habitat Assessment & Rating for Transition Initiatives – Linear Infrastructure (DHARTI-LI 1.0)**, Rating System aims to offer a structured framework to assess sustainability across the project lifecycle, targeting key parameters such as energy efficiency, water management, waste minimization, ecological conservation, and carbon footprint reduction. This system aligns with India's national Net Zero by 2070 goal and the vision of Viksit Bharat by 2047, supporting the urgent need for climate-resilient infrastructure. Investment in resilient infrastructure is critical: the World Bank estimates India will require over \$2.4 trillion by 2050 and \$10.9 trillion by 2070<sup>1</sup> to build climate-resilient infrastructure, highlighting the economic and social imperative for sustainable development.

Implementing this rating system now is of paramount importance to enforce measurable benchmarks, drive efficiency gains (such as 15-30% reductions in lifecycle emissions), and foster stakeholder accountability among developers and contractors. By systemically integrating sustainability into infrastructure planning, construction, and maintenance, India can mitigate adverse ecological and social impacts, enhance resilience to climate risks, and promote broader adoption of sustainable practices across all infrastructure sectors, ensuring a resilient and low-carbon future development.

Note: The complete guidebook/manual is currently under development and will be launched within six months. It will provide a comprehensive process covering all stages, from registration through to final certification.

<sup>1</sup> <https://visionias.in/current-affairs/upsc-daily-news-summary/article/2025-07-23/business-standard/indian-society/india-needs-24-trn-to-build-climate-resilient-infra-by-2050-world-bank>

## Scope of Work under DHARTI–LI Rating System

The DHARTI – Linear Infrastructure Rating System applies to a wide range of linear infrastructure projects that extend across corridors and landscapes and have significant environmental, social, and economic impacts over their lifecycle. The scope of work under DHARTI-LI encompasses sustainability assessment, performance benchmarking, and outcome-based rating across planning, design, construction, operation, and maintenance phases.

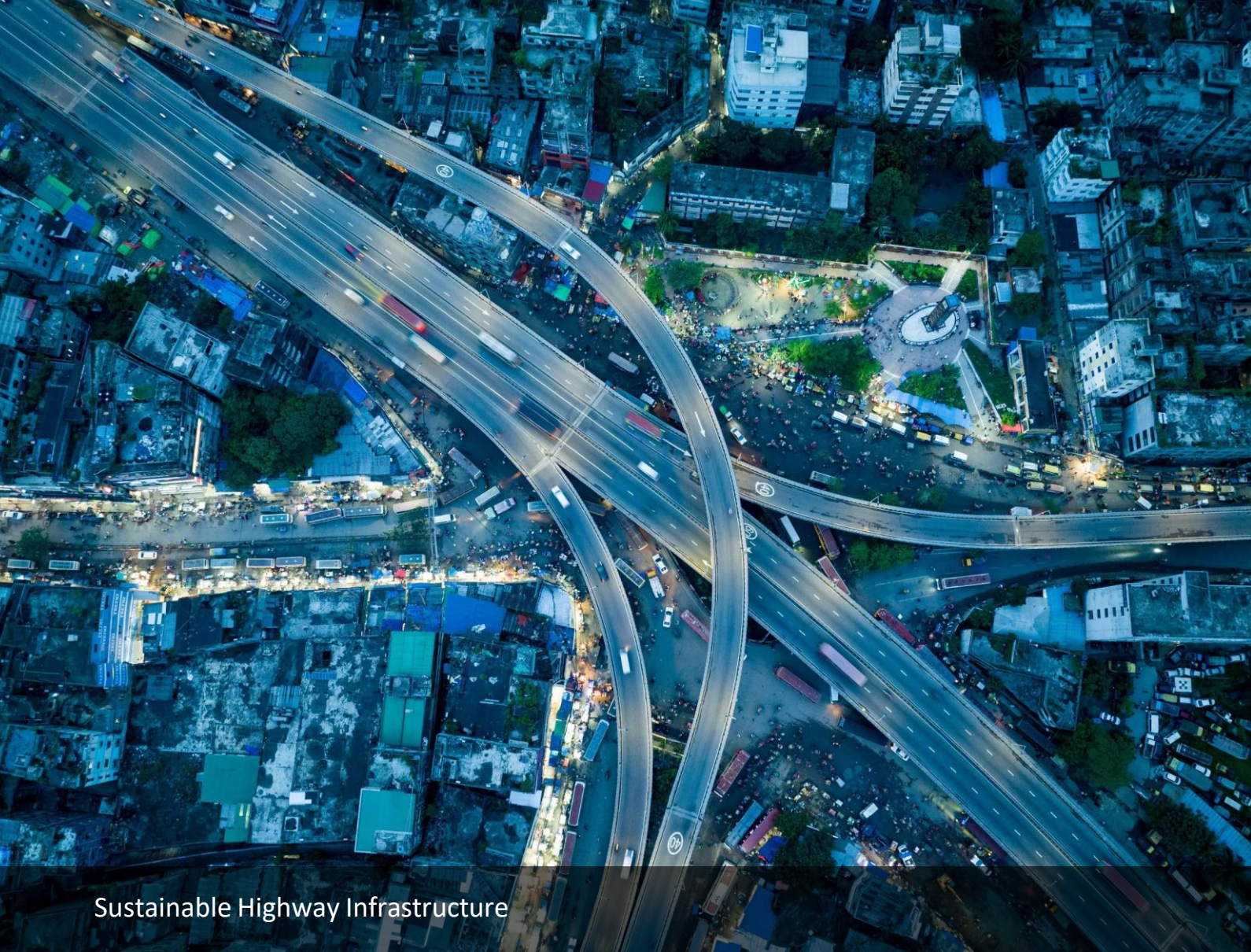
To ensure clarity in project registration, assessment consistency, and sector-specific benchmarking, DHARTI-LI defines the following linear infrastructure categories and corresponding scope of work.

### Linear Infrastructure Categories

<p><b>Road &amp; Highway Infrastructure</b> Arterials, expressways, interchanges, pavements &amp; ITS.</p>	<p><b>Rail Infrastructure</b> Tracks, signaling, stations, electrification &amp; rolling stock.</p>	<p><b>Bridges &amp; Viaducts</b> Spans, elevated corridors, seismic detailing &amp; structural health.</p>	<p><b>Tunnels &amp; Underground</b> Bored/cut-and-cover links, ventilation &amp; fire-life safety.</p>	<p><b>Airport Runways &amp; Taxiways</b> Airside pavements, lighting, markings &amp; apron geometry.</p>
<p><b>Pipelines &amp; Networks</b> Oil, gas, water conveyance, pumping stations &amp; integrity.</p>	<p><b>Transmission Lines</b> Power grids, utility corridors, substations &amp; fiber optics.</p>	<p><b>Canals &amp; Waterways</b> Navigation channels, locks, drainage &amp; flood control.</p>	<p><b>Ports &amp; Maritime Infrastructure</b> Berths, quays, breakwaters, dredging &amp; logistics yards.</p>	<p><b>Multi-Modal Corridors</b> Integrated road-rail-port hubs &amp; intermodal logistics.</p>

Sector / Infrastructure Type	Indicative Project Coverage	Scope of Work under DHARTI-LI
<b>Road &amp; Highway Infrastructure</b>	Expressways, national & state highways, urban roads, service roads	Assessment of material efficiency, pavement durability, energy use during construction, water and waste management, road safety, community impact, lifecycle emissions, and climate resilience
<b>Rail Infrastructure</b>	Broad gauge, standard gauge, metro rail, light rail, high-speed rail	Evaluation of track materials, energy and carbon performance, land use impacts, noise and vibration control, passenger safety, station-interface impacts, and long-term operational resilience
<b>Bridges &amp; Viaducts</b>	Road bridges, rail bridges, flyovers, cable-stayed and	Review of structural material efficiency, durability design, construction energy use, ecological and

	suspension bridges	riverine impact mitigation, safety, and lifecycle performance
<b>Tunnels</b>	Road tunnels, rail tunnels, mountain tunnels	Assessment of excavation methods, material and energy efficiency, spoil and waste management, groundwater protection, ventilation energy use, safety systems, and climate resilience
<b>Airport Runways &amp; Taxiways</b>	Runways, taxiways, apron-related linear elements	Evaluation of pavement materials, construction emissions, drainage and stormwater management, noise mitigation, operational energy efficiency, and safety considerations
<b>Pipelines</b>	Oil & gas pipelines, water supply pipelines, sewerage networks	Assessment of route planning, land disturbance, material durability, leak prevention, construction impacts, safety, and long-term operational integrity
<b>Transmission Lines &amp; Utility Corridors</b>	Overhead power lines, underground cables, utility corridors	Evaluation of corridor optimisation, land and ecological impact, material selection, construction practices, safety, and resilience to climate and extreme events
<b>Canals, Waterways &amp; Drainage Corridors</b>	Irrigation canals, navigation waterways, stormwater drains	Assessment of water efficiency, lining materials, erosion control, ecological protection, community interface, and long-term hydraulic performance
<b>Ports &amp; Maritime Linear Infrastructure</b>	Access roads, rail sidings, conveyor corridors, pipelines within port limits	Review of material and energy efficiency, coastal and marine impact management, emissions control, logistics optimisation, and safety
<b>Multi-Modal Corridors</b>	Integrated road-rail-utility corridors	Integrated assessment covering combined impacts on land use, materials, energy, emissions, social interface, safety, and lifecycle resilience



## Sustainable Highway Infrastructure

Sustainable highway infrastructure integrates planning, design, construction, and operation practices that minimise environmental impact while enhancing safety, resilience, and long-term performance. It promotes efficient resource use, reduced energy and carbon emissions, responsible land and water management, and ecosystem protection. Under the DHARTI-LI framework, performance-based criteria evaluate durability, lifecycle efficiency, climate resilience, and social responsibility, ensuring highways support economic growth and sustainable development.

# 1. IMPACT CATEGORY:

## 1.1 Materials & Resources

This component focuses on the efficient and responsible use of construction materials such as concrete, steel, bitumen, and aggregates. It promotes the use of low-carbon, recycled, locally sourced, and durable materials to reduce resource depletion, embodied energy, and long-term maintenance impacts over the project life cycle.

Credit ID	Credit Name	Sub-Components / Requirements	Sustainability Outcome	Points
MR-1*	Low-Carbon Materials	Fly ash/GGBS cement, low-carbon concrete, low-carbon steel/recycled Contained steel	Reduced embodied carbon	0
MR-2	Recycled Content	RAP, recycled aggregates, reused earth	Circular economy	7
MR-3	Responsible Sourcing	Local materials, certified suppliers	Reduced transport emissions	5
MR-4	Durability	Long-life pavement, corrosion resistance, long-life protective coatings, paints or other materials	Reduced maintenance-related resource	4
<b>TOTAL</b>				<b>16</b>

### Documents Required:

Credit	Documents List
<b>MR-1 (Low-Carbon Materials)</b>	<ul style="list-style-type: none"> <li>Concrete mix design reports</li> <li>Cement type and replacement percentage (Fly ash / GGBS) Purchase</li> <li>Steel/Iron type, grade and recycled content percentage (TMT bars / structural steel)</li> <li>Invoices &amp; delivery challans</li> <li>Manufacturer Environmental Product Declarations (EPD), if available</li> <li>Material compliance summary sheet</li> <li>Embodied carbon calculation (if applicable)</li> <li>Photographic evidence at batching plant/site</li> <li>Steel/Iron purchase invoices, TDS</li> <li>Mill test certificates</li> </ul>
<b>MR-2 (Recycled Content)</b>	<ul style="list-style-type: none"> <li>RAP usage records</li> <li>Recycled aggregate test reports</li> <li>Earthwork balance statement (cut-fill analysis)</li> <li>Quantity comparison (virgin vs recycled)</li> <li>Method statement for reuse</li> <li>Site photographs</li> </ul>

<p><b>MR-3 (Responsible Sourcing)</b></p>	<ul style="list-style-type: none"> <li>• Supplier distance calculation</li> <li>• Vendor sustainability declarations</li> <li>• Certification documents (ISO, EMS)</li> <li>• Material procurement log</li> <li>• Local sourcing percentage summary</li> </ul>
<p><b>MR-4 (Durability)</b></p>	<ul style="list-style-type: none"> <li>• Pavement design life calculations</li> <li>• Material durability test results</li> <li>• Design drawings and specifications</li> <li>• Details of long-life coatings / paints used or other materials</li> <li>• Product technical data sheets for coatings and alternative durable materials</li> </ul>

## 1.2 Energy & Carbon Emissions

This component addresses energy consumption and greenhouse gas emissions arising from construction activities, equipment operation, and material transportation. The objective is to minimize fossil fuel use, improve energy efficiency, and adopt renewable energy sources, thereby supporting low-carbon and climate-friendly infrastructure development.

Credit ID	Credit Name	Sub-Components / Requirements	Sustainability Outcome	Points
EC-1*	Construction Energy Efficiency	Fuel-efficient equipment, reduced idling	Lower fuel consumption	0
EC-2	Renewable Energy Use	Solar lighting, renewable power at camps	Clean energy adoption	6
EC-3	Carbon Monitoring	GHG inventory, emission reduction plan	Climate accountability	6
EC-4	Efficient Logistics	Optimized transport routes, batching	Reduced emissions	4
<b>TOTAL</b>				<b>16</b>

### Documents Required:

Credit	Documents List
EC-1 (Construction Energy Efficiency) *	<ul style="list-style-type: none"> <li>• Equipment inventory</li> <li>• Fuel consumption logs</li> <li>• Maintenance records</li> <li>• Energy efficiency action plan</li> <li>• Monthly energy performance report</li> </ul>
EC-2 (Renewable Energy Use)	<ul style="list-style-type: none"> <li>• Solar system layout</li> <li>• Energy generation data</li> <li>• Installation invoices</li> <li>• Renewable energy percentage calculation</li> <li>• Photographic evidence</li> </ul>
EC-3 (Carbon Monitoring)	<ul style="list-style-type: none"> <li>• GHG inventory calculation</li> <li>• Emission factors used</li> <li>• Reduction strategies implemented</li> <li>• Carbon management plan</li> <li>• Monitoring spreadsheets</li> </ul>
EC-4 (Efficient Logistics)	<ul style="list-style-type: none"> <li>• Material transport route plans</li> <li>• Batch plant location maps</li> <li>• Logistics optimization report</li> <li>• Fuel savings calculation</li> </ul>



## Land Use, Ecology, Biodiversity & Water Management

Integrated planning to optimise land use, conserve ecosystems and biodiversity, and ensure efficient, sustainable water resource management through protection, restoration, and responsible utilisation.

## 1.3 Land Use, Ecology & Biodiversity

This component aims to minimize land disturbance and protect natural ecosystems affected by linear transportation corridors. It emphasizes alignment optimization, biodiversity conservation, habitat connectivity, and ecological restoration, ensuring long-term environmental balance and reduced ecological fragmentation.

Credit ID	Credit Name	Sub-Components / Requirements	Sustainability Outcome	Points
LE-1*	Minimized Land Disturbance	Optimized alignment, reduced ROW	Habitat protection	0
LE-2	Biodiversity Protection	Wildlife crossings, tree protection, hill cutting, tunnelling, and slope excavation	Ecosystem continuity	5
LE-3	Ecological Restoration	Compensatory plantation, native species	Biodiversity enhancement	4
LE-4	Soil Conservation	Topsoil reuse, erosion control, slope stabilization	Land restoration	5
<b>TOTAL</b>				<b>14</b>

### Documents Required:

Credit	Documents List
LE-1 (Minimized Land Disturbance) *	<ul style="list-style-type: none"> <li>• Alignment drawings</li> <li>• ROW comparison analysis</li> <li>• Design justification notes</li> <li>• Area impact calculations</li> </ul>
LE-2 (Biodiversity Protection)	<ul style="list-style-type: none"> <li>• Tree census report</li> <li>• Wildlife crossing drawings</li> <li>• Environmental clearance conditions</li> <li>• Tree protection plan</li> <li>• Site photographs</li> <li>• Hill cutting &amp; tunnelling impact mitigation plan</li> </ul>
LE-3 (Ecological Restoration)	<ul style="list-style-type: none"> <li>• Plantation records</li> <li>• Species selection list</li> <li>• Survival rate monitoring plan</li> <li>• Plantation completion report</li> </ul>
LE-4 (Soil Conservation)	<ul style="list-style-type: none"> <li>• Topsoil management plan</li> <li>• Erosion control measures</li> <li>• Method statements</li> <li>• Photographic evidence</li> <li>• Slope stabilization drawings</li> <li>• Geotechnical investigation report</li> </ul>

## 1.4 Water Management

This component focuses on efficient water use and protection of water resources during construction and operation. It encourages water conservation, stormwater management, pollution prevention, and rainwater harvesting, particularly important in water-stressed regions.

Credit ID	Credit Name	Sub-Components / Requirements	Sustainability Outcome	Points
WM-1	Water Use Efficiency	Treated wastewater, efficient curing, use of curing compounds	Freshwater conservation	4
WM-2	Stormwater Management	Sediment traps, drainage design	Flood risk reduction	3
WM-3*	Water Quality Protection	Oil traps, controlled discharge	Pollution prevention	0
WM-4	Rainwater Harvesting	Camps & facilities	Water self-sufficiency	1
<b>TOTAL</b>				<b>8</b>

### Documents Required:

Credit	Documents List
<b>WM-1 (Water Use Efficiency)</b>	<ul style="list-style-type: none"> <li>• Water consumption logs</li> <li>• Source approvals</li> <li>• Water balance statement</li> <li>• Efficiency improvement plan</li> <li>• Invoices of Add mixtures or any other method, for save water</li> <li>• Application method statement or any other method, for save water</li> <li>• List of Add mixtures or any other method, for save water</li> <li>• TDS of Add mixtures or any other method, for save water</li> </ul>
<b>WM-2 (Stormwater Management)</b>	<ul style="list-style-type: none"> <li>• Drainage drawings</li> <li>• Sediment trap details</li> <li>• Stormwater management report</li> <li>• Site photographs</li> </ul>
<b>WM-3 (Water Quality Protection) *</b>	<ul style="list-style-type: none"> <li>• Oil &amp; grease trap details</li> <li>• Effluent discharge test reports</li> <li>• Pollution control plan</li> <li>• Monitoring records</li> </ul>
<b>WM-4 (Rainwater Harvesting)</b>	<ul style="list-style-type: none"> <li>• RWH system drawings</li> <li>• Storage capacity calculations</li> <li>• Installation photographs</li> <li>• Utilization statement</li> </ul>



## Bridge Engineering

Bridge engineering involves the planning, design, construction, and maintenance of bridges to ensure safety, durability, and long-term performance while minimising environmental and social impacts. Sustainable bridge engineering promotes efficient material use, low-carbon construction, durability-focused design, and protection of surrounding ecosystems. Under the DHARTI-LI framework, bridge projects are assessed based on lifecycle performance, resource efficiency, construction impacts, climate resilience, and public safety, ensuring structurally sound, cost-effective, and sustainable infrastructure solutions.

## 1.5 Waste Management

This component promotes reduction, reuse, and recycling of construction and demolition waste generated during project execution. The goal is to minimize landfill disposal, encourage material recovery, and support circular economy practices within linear infrastructure development.

Credit ID	Credit Name	Sub-Components/ Requirements	Sustainability Outcome	Points
WE-1*	C&D Waste Management	Segregation, authorized disposal	Reduced landfill use	0
WE-2	Material Reuse	Excavated soil, pavement recycling	Resource efficiency	4
WE-3	Hazardous Waste Control	Bitumen, oils, chemicals, sewage and sanitation waste from labour camps	Environmental protection	2
WE-4	Zero-Waste Strategy	Waste tracking, recycling targets	Circular construction	2
<b>TOTAL</b>				<b>8</b>

### Documents Required:

Credit	Documents List
<b>WE-1 (C&amp;D Waste Management)*</b>	<ul style="list-style-type: none"> <li>Waste generation records</li> <li>Disposal receipts</li> <li>Waste management plan</li> <li>Monthly waste summary</li> </ul>
<b>WE-2 (Material Reuse)</b>	<ul style="list-style-type: none"> <li>Reuse quantity logs</li> <li>Recycling vendor approvals</li> <li>Circular economy statement</li> <li>Site photographs</li> </ul>
<b>WE-3 (Hazardous Waste Control)</b>	<ul style="list-style-type: none"> <li>MSDS sheets</li> <li>Storage facility details</li> <li>Hazardous waste handling SOP</li> <li>Disposal certificates</li> <li>Operation &amp; maintenance records of sanitation systems</li> <li>Labour camp sanitation layout and photographs</li> </ul>
<b>WE-4 (Zero-Waste Strategy)</b>	<ul style="list-style-type: none"> <li>Waste diversion percentage</li> <li>Recycling records</li> <li>Zero-waste action plan</li> <li>Tracking sheets</li> </ul>

## 1.6 Air Quality, Noise & Vibration

This component addresses construction-related air pollution, noise, and vibration impact on workers and surrounding communities. It focuses on dust suppression, emission control, noise mitigation, and vibration monitoring to protect public health and environmental quality.

Credit ID	Credit Name	Sub-Components / Requirements	Sustainability Outcome	Points
AQ-1*	Dust Control	Water spraying, covered transport	Improved air quality	0
AQ-2	Emission Control	Equipment standards, maintenance	Reduced pollution	4
AQ-3	Noise Mitigation	Barriers, restricted work hours, use of low-noise construction equipment	Community comfort	3
AQ-4	Vibration Management	Monitoring, controlled blasting	Structural safety	2
<b>TOTAL</b>				<b>9</b>

### Documents Required:

Credit	Documents List
<b>AQ-1 (Dust Control)*</b>	<ul style="list-style-type: none"> <li>• Water spraying logs</li> <li>• Covered transport photos</li> <li>• Dust suppression plan</li> <li>• PPE distribution records</li> </ul>
<b>AQ-2 (Emission Control)</b>	<ul style="list-style-type: none"> <li>• PUC certificates</li> <li>• Equipment maintenance logs</li> <li>• Emission compliance report</li> </ul>
<b>AQ-3 (Noise Mitigation)</b>	<ul style="list-style-type: none"> <li>• Noise monitoring data</li> <li>• Barrier installations</li> <li>• Noise management plan</li> <li>• Equipment specifications showing noise levels</li> </ul>
<b>AQ-4 (Vibration Management)</b>	<ul style="list-style-type: none"> <li>• Vibration monitoring reports</li> <li>• Structural protection notes</li> </ul>



## Health, Safety, Well-being & Community Impact

Promoting safe, healthy environments while enhancing social value through inclusive development, stakeholder engagement, and positive community outcomes.

## 1.7 Health, Safety & Well-being

This component ensures the safety, health, and welfare of workers and the public throughout the project lifecycle. It emphasizes safe construction practices, traffic management, workers welfare facilities, and emergency preparedness, contributing to ethical and responsible infrastructure delivery.

Credit ID	Credit Name	Sub-Components / Requirements	Sustainability Outcome	Points
HS-1*	Workers Safety	PPE, safety training	Accident reduction	0
HS-2	Public Safety	Traffic management, signage	Safer mobility	3
HS-3	Workers Welfare	Drinking water, sanitation	Ethical construction	3
HS-4	Emergency Preparedness	First aid, response plans	Risk mitigation	1
<b>TOTAL</b>				<b>7</b>

### Documents Required:

Credit	Documents List
HS-1 (Workers Safety)*	<ul style="list-style-type: none"> <li>• PPE distribution records</li> <li>• Training attendance sheets</li> <li>• Safety management plan</li> </ul>
HS-2 (Public Safety)	<ul style="list-style-type: none"> <li>• Traffic management drawings</li> <li>• Signage photos</li> <li>• Public safety compliance report</li> </ul>
HS-3 (Workers Welfare)	<ul style="list-style-type: none"> <li>• Camp layout</li> <li>• Facility photos</li> <li>• Welfare facility checklist</li> </ul>
HS-4 (Emergency Preparedness)	<ul style="list-style-type: none"> <li>• Emergency drills records</li> <li>• Emergency response plan</li> <li>• Health Insurance of Manpower</li> </ul>

## 1.8 Community & Social Impact

This component focuses on social sustainability and community well-being by addressing stakeholder engagement, accessibility, and cultural sensitivity. It aims to build trust, reduce social disruption, and enhance community acceptance of linear transportation projects.

Credit ID	Credit Name	Sub-Components / Requirements	Sustainability Outcome	Points
CS-1*	Stakeholder Engagement	Consultations, grievance redressal	Social acceptance	0
CS-2	Accessibility & Inclusivity	Safe crossings, universal access	Social equity	4
CS-3	Cultural Heritage Protection	Archaeological safeguards	Heritage conservation	3
<b>TOTAL</b>				<b>7</b>

### Documents Required:

Credit	Documents List
<b>CS-1 (Stakeholder Engagement) *</b>	<ul style="list-style-type: none"> <li>• Meeting minutes</li> <li>• Grievance records</li> <li>• Stakeholder engagement report</li> <li>• Social Impact Survey</li> <li>• Questionnaire used for survey</li> </ul>
<b>CS-2 (Accessibility &amp; Inclusivity)</b>	<ul style="list-style-type: none"> <li>• Design drawings for crossings</li> <li>• Accessibility compliance note</li> </ul>
<b>CS-3 (Cultural Heritage Protection)</b>	<ul style="list-style-type: none"> <li>• Cultural / Archaeological Impact Assessment (if applicable)</li> <li>• Records of Consultation, Archaeological Survey of India (ASI) / State Archaeology Dept.</li> <li>• Records of Consultation, Local authorities or community representatives</li> <li>• Chance Find Procedure (CFP) document</li> <li>• Approved alignment drawings showing avoidance or buffer zones</li> <li>• Photographs of protected cultural sites near the project corridor</li> <li>• Cultural Heritage Management Plan (CHMP) including:               <ol style="list-style-type: none"> <li>1. Identification of cultural assets</li> <li>2. Protection and mitigation measures</li> <li>3. Buffer zone provisions</li> </ol> </li> <li>• Chance Find Procedure signed by contractor and client</li> <li>• Compliance letter / NOC from relevant authority (if applicable)</li> <li>• Training records showing worker awareness on cultural heritage protection</li> <li>• Site signage photographs (heritage protection notices)</li> </ul>



## Resilience, Climate Adaptation & Lifecycle Sustainability

Strengthening infrastructure to withstand climate risks while ensuring long-term economic viability and maximised lifecycle value.

## 1.9 Resilience & Climate Adaptation

This component ensures that transportation infrastructure is resilient to climate risks and future uncertainties such as extreme weather events, flooding, and traffic growth. It promotes climate-resilient design, disaster risk reduction, and future-ready planning to protect long-term public investment.

Credit ID	Credit Name	Sub-Components / Requirements	Sustainability Outcome	Points
RC-1*	Climate-Resilient Design	Flood-resistant, heat-resistant design, climate projection data	Infrastructure longevity	0
RC-2	Disaster Risk Reduction	Drainage, slope stabilization, landslide risk, tunnel safety	Reduced failure risk	5
RC-3	Future Readiness	Design for increased demand	Long-term adaptability	5
<b>TOTAL</b>				<b>10</b>

### Documents Required:

Credit	Documents List
<b>RC-1 (Climate-Resilient Design) *</b>	<ul style="list-style-type: none"> <li>Climate risk assessment projection data (Ex: temperature change, rainfall trends, etc.)</li> <li>Design adaptation notes</li> <li>Resilience strategy report</li> </ul>
<b>RC-2 (Disaster Risk Reduction)</b>	<ul style="list-style-type: none"> <li>Flood/slope stability analysis</li> <li>Disaster mitigation plan</li> <li>Landslide hazard assessment report</li> <li>Tunnel risk assessment</li> <li>Geotechnical design report</li> </ul>
<b>RC-3 (Future Readiness)</b>	<ul style="list-style-type: none"> <li>Traffic projection and growth analysis</li> <li>Design reports considering:               <ol style="list-style-type: none"> <li>Increased axle loads</li> <li>Higher traffic volumes</li> </ol> </li> <li>Provision details for:               <ol style="list-style-type: none"> <li>Future widening</li> <li>Utility corridors</li> <li>Smart transport systems (ITS, EV readiness where applicable)</li> </ol> </li> <li>Climate projection references (rainfall, temperature, flooding)</li> <li>Future Readiness / Adaptability Report covering:               <ol style="list-style-type: none"> <li>Design life assumptions of 15 Years or more</li> <li>Climate stress scenarios</li> <li>Expansion or upgrade provisions</li> </ol> </li> <li>Drawings showing:               <ol style="list-style-type: none"> <li>Reserved ROW for future widening</li> <li>Drainage capacity beyond current demand</li> </ol> </li> <li>Engineer's design justification notes</li> <li>Relevant codes/standards referenced for future loads</li> </ul>

## 1.10 Economic Sustainability & Lifecycle Value

This category assesses the economic performance and financial sustainability of linear infrastructure projects by promoting lifecycle cost efficiency, alignment with sustainable finance frameworks, and generation of local economic value.

Credit ID	Credit Name	Sub-Components / Requirements	Sustainability Outcome	Points
ES-1*	Lifecycle Cost Analysis (LCCA)	Lifecycle cost modelling, O&M cost projections, value-for-money assessment	Improved lifecycle cost efficiency	0
ES-2	Green Finance & ESG Alignment	ESG framework alignment, green bond eligibility, sustainability finance criteria	Enhanced access to sustainable finance	3
ES-3	Local Economic Benefits	MSME/SME procurement, skill development	Strengthened local economy	2
<b>TOTAL</b>				<b>5</b>

### Documents Required:

Credit	Documents List
<b>ES-1 (Lifecycle Cost Analysis (LCCA) *</b>	<ul style="list-style-type: none"> <li>• Lifecycle Cost Analysis (LCCA) report</li> <li>• O&amp;M cost projections</li> <li>• Comparison of design or material alternatives</li> <li>• Cost assumptions and calculation sheets</li> </ul>
<b>ES-2 (Green Finance &amp; ESG Alignment)</b>	<ul style="list-style-type: none"> <li>• ESG framework or policy document</li> <li>• Green finance or sustainability-linked finance eligibility note</li> <li>• Sustainability disclosure or reporting template</li> <li>• Financing proposal highlighting sustainability criteria</li> </ul>
<b>ES-3 (Local Economic Benefits)</b>	<ul style="list-style-type: none"> <li>• Labour engagement records</li> <li>• List of MSME/SME vendors engaged</li> <li>• Skill development or training programme details</li> <li>• Community development or livelihood support plan</li> <li>• Photographic evidence</li> </ul>

## 1.11 Innovation Credit

To encourage the adoption and implementation of innovative strategies, technologies, and practices that go beyond the prescribed criteria and significantly enhance the overall sustainability performance of linear infrastructure projects.

### 1.11.1 Appraisal

Implementation of innovative strategies, independent of all other criteria, to enhance overall project sustainability.

- Early-stage integration of sustainability or innovation expert throughout the project life cycle. **(2 Points)**
- Introduction of socially beneficial or inclusive infrastructure features (e.g., cultural elements, inclusive sanitation, smart safety systems). **(2 Points)**
- Adoption of construction or operational practices leading to minimal material wastage or circular use of resources. **(2 Points)**
- Application of performance-enhancing solutions such as net positive energy or water systems or real-time monitoring mechanisms. **(2 Points)**
- Deployment of any other approved innovation that demonstrably improves environmental or social performance of the project. **(2 Points)**

**Note:** Innovation credits recognise innovative solutions that improve sustainability performance beyond standard criteria, enabling higher award tiers while maintaining the rigor of mandatory credits and encouraging continuous improvement and R&D.



## Modern Urban Infrastructure

Modern urban infrastructure integrates mobility, utilities, and public systems within dense environments to enhance efficiency, resilience, and quality of life. It promotes sustainable design, efficient land and resource use, lower emissions, improved safety, and cohesive urban integration. Under the DHARTI-LI framework, projects are evaluated on environmental performance, social inclusivity, operational efficiency, climate resilience, and lifecycle value, enabling adaptive, low-carbon, and future-ready cities.

## TOTAL POINTS SUMMARY

S. No.	Impact Category	Alignment with UN Sustainable Development Goals (SDGs)	Points
1.	Materials & Resources	SDGs: 13, 12, & 9	16
2.	Energy & Carbon Emissions	SDGs: 13 & 7	16
3.	Land Use, Ecology & Biodiversity	SDGs: 15	14
4.	Water Management	SDGs: 6 & 11	8
5.	Waste Management	SDGs: 12 & 3	8
6.	Air Quality, Noise & Vibration	SDGs: 3 & 11	9
7.	Health, Safety & Well-Being	SDGs: 8 & 11	7
8.	Community & Social Impact	SDGs: 10, 11, & 16	7
9.	Resilience & Climate Adaptation	SDGs: 9, 11, & 13	10
10.	Economic Sustainability & Lifecycle Value	SDGs: 8, 9, 11, 12, & 17	5
<b>Total</b>			<b>100</b>
11.	Innovation	-	100 + 10
<b>Grand Total</b>			<b>110</b>

**Note:** Under the DHARTI-LI 1.0 framework, all credits are aligned with the **United Nations Sustainable Development Goals (SDGs)** to ensure global relevance and consistency with internationally recognized sustainability objectives. For a comprehensive understanding of how each credit and sub-credit corresponds to specific SDGs, including detailed explanations of the alignment, please refer to the Appendix section of this manual.

## RATING LEVELS

Performance Benchmarks

### DHARTI-LI Rating System

Certification Levels

<div style="text-align: center; margin-bottom: 10px;"> </div> <p style="font-size: 1.2em; font-weight: bold; margin: 0;">Platinum</p> <p style="font-size: 0.8em; margin: 0;">Score Range</p> <p style="font-size: 1.5em; font-weight: bold; margin: 5px 0;">≥ 75+</p> <div style="background-color: #4a5568; color: white; padding: 5px; text-align: center; margin: 10px 0; font-size: 0.8em;">Highest Distinction</div> <ul style="list-style-type: none"> <li>✓ Exceeds global standards</li> <li>✓ Best-in-class resilience</li> <li>✓ Future-proof innovation</li> </ul>	<div style="text-align: center; margin-bottom: 10px;"> </div> <p style="font-size: 1.2em; font-weight: bold; margin: 0;">Gold</p> <p style="font-size: 0.8em; margin: 0;">Score Range</p> <p style="font-size: 1.5em; font-weight: bold; margin: 5px 0;">≥ 60–74</p> <div style="background-color: #4a5568; color: white; padding: 5px; text-align: center; margin: 10px 0; font-size: 0.8em;">High Performance</div> <ul style="list-style-type: none"> <li>✓ Superior quality assets</li> <li>✓ Optimized operational efficiency</li> <li>✓ Robust safety protocols</li> </ul>	<div style="text-align: center; margin-bottom: 10px;"> </div> <p style="font-size: 1.2em; font-weight: bold; margin: 0;">Silver</p> <p style="font-size: 0.8em; margin: 0;">Score Range</p> <p style="font-size: 1.5em; font-weight: bold; margin: 5px 0;">≥ 45–59</p> <div style="background-color: #4a5568; color: white; padding: 5px; text-align: center; margin: 10px 0; font-size: 0.8em;">Standard Compliance</div> <ul style="list-style-type: none"> <li>✓ Meets essential criteria</li> <li>✓ Reliable service delivery</li> <li>✓ Adequate maintenance</li> </ul>	<div style="text-align: center; margin-bottom: 10px;"> </div> <p style="font-size: 1.2em; font-weight: bold; margin: 0;">Certified</p> <p style="font-size: 0.8em; margin: 0;">Score Range</p> <p style="font-size: 1.5em; font-weight: bold; margin: 5px 0;">≥ 30–44</p> <div style="background-color: #4a5568; color: white; padding: 5px; text-align: center; margin: 10px 0; font-size: 0.8em;">Baseline Qualification</div> <ul style="list-style-type: none"> <li>✓ Minimum functional reqs</li> <li>✓ Basic structural integrity</li> <li>✓ Foundational compliance</li> </ul>
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# APPENDIX

## Alignment with UN Sustainable Development Goals (SDGs)

### 1. Materials & Resources

Credit ID	Sub-Credit	SDG	Goal Name	Alignment Explanation
MR-1*	Low-Carbon Materials	SDG 13	Climate Action	Reduces embodied carbon and greenhouse gas emissions, directly supporting climate mitigation and low-carbon development.
MR-2	Recycled Content	SDG 12	Responsible Consumption and Production	Promotes resource efficiency, recycling, and circular use of materials, reducing extraction of virgin resources.
MR-3	Responsible Sourcing	SDG 12	Responsible Consumption and Production	Encourages sustainable supply chains, ethical sourcing, and reduced environmental footprints.
MR-4	Durability	SDG 9	Industry, Innovation and Infrastructure	Supports long-life infrastructure and sustainable asset development.

### 2. Energy & Carbon Emissions

Credit ID	Sub-Credit	SDG	Goal Name	Alignment Explanation
EC-1*	Construction Energy Efficiency	SDG 7 and 13	Affordable and Clean Energy and Climate Action	Promotes energy efficiency and reduced fossil fuel use during construction.
EC-2	Renewable Energy Use	SDG 7	Affordable and Clean Energy	Supports clean energy transition and renewable energy deployment.
EC-3	Carbon Monitoring	SDG 13	Climate Action	Enables climate accountability, emissions reduction planning, and climate governance.
EC-4	Efficient Logistics	SDG 13	Climate Action	Reduces transport emissions and carbon footprint through optimized logistics.

### 3. Land & Ecology and Biodiversity

Credit ID	Sub-Credit	SDG	Goal Name	Alignment Explanation
LE-1*	Minimized Land Disturbance	SDG 15	Life on Land	Protects ecosystems, forests, and natural habitats from degradation.
LE-2	Biodiversity Protection	SDG 15	Life on Land	Conserves biodiversity, wildlife habitats, and ecological networks.
LE-3	Ecological Restoration	SDG 15	Life on Land	Restores degraded land and ecosystems, strengthening ecological resilience.

LE-4	Soil Conservation	SDG 15	Life on Land	Protects soil health, land productivity, and ecosystem stability.
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#### 4. Water Management

Credit ID	Sub-Credit	SDG	Goal Name	Alignment Explanation
WM-1	Water Use Efficiency	SDG 6	Clean Water and Sanitation	Supports efficient water use and sustainable freshwater management.
WM-2	Stormwater Management	SDG 11	Sustainable Cities and Communities	Strengthens urban resilience, flood protection, and climate-adaptive infrastructure.
WM-3*	Water Quality Protection	SDG 6	Clean Water and Sanitation	Prevents pollution of water bodies and protects drinking water sources.
WM-4	Rainwater Harvesting	SDG 6	Clean Water and Sanitation	Enhances water availability and sustainable water resource management.

#### 5. Waste Management

Credit ID	Sub-Credit	SDG	Goal Name	Alignment Explanation
WE-1*	C&D Waste Management	SDG 12	Responsible Consumption and Production	Improves waste segregation, recycling, and sustainable waste systems.
WE-2	Material Reuse	SDG 12	Responsible Consumption and Production	Promotes circular economy and resource efficiency.
WE-3	Hazardous Waste Control	SDG 3	Good Health and Well-being	Prevents health risks, pollution exposure, and environmental contamination.
WE-4	Zero-Waste Strategy	SDG 12	Responsible Consumption and Production	Drives long-term waste reduction, circular construction, and material recovery.

#### 6. Air, Noise & Vibration

Credit ID	Sub-Credit	SDG	Goal Name	Alignment Explanation
AQ-1*	Dust Control	SDG 3	Good Health and Well-being	Improves air quality and protects human health.
AQ-2	Emission Control	SDG 3	Good Health and Well-being	Reduces exposure to harmful pollutants and respiratory risks.
AQ-3	Noise Mitigation	SDG 11	Sustainable Cities and Communities	Improves urban liveability and community wellbeing.
AQ-4	Vibration Management	SDG 11	Sustainable Cities and Communities	Protects built environments and community safety.

#### 7. Health & Safety

Credit ID	Sub-Credit	SDG	Goal Name	Alignment Explanation
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HS-1*	Workers Safety	SDG 8	Decent Work and Economic Growth	Ensures safe working conditions and labour protection.
HS-2	Public Safety	SDG 11	Sustainable Cities and Communities	Protects public safety in shared urban spaces.
HS-3	Workers Welfare	SDG 8	Decent Work and Economic Growth	Promotes dignity, wellbeing, and fair working conditions.
HS-4	Emergency Preparedness	SDG 11	Sustainable Cities and Communities	Strengthens resilience, disaster preparedness, and safety systems.

## 8. Community & Social Impact

Credit ID	Sub-Credit	SDG	Goal Name	Alignment Explanation
CS-1*	Stakeholder Engagement	SDG 16	Peace, Justice and Strong Institutions	Promotes inclusive decision-making, transparency, and trust-building.
CS-2	Accessibility & Inclusivity	SDG 10	Reduced Inequalities	Ensures equal access and inclusive infrastructure.
CS-3	Cultural Heritage Protection	SDG 11	Sustainable Cities and Communities	Preserves cultural identity and community heritage.

## 9. Resilience & Climate Adaptation

Credit ID	Sub-Credit	SDG	Goal Name	Alignment Explanation
RC-1*	Climate-Resilient Design	SDG 13	Climate Action	Supports climate adaptation, resilience, and long-term infrastructure safety.
RC-2	Disaster Risk Reduction	SDG 11	Sustainable Cities and Communities	Protects cities, communities, and public assets from disasters.
RC-3	Future Readiness	SDG 9	Industry, Innovation and Infrastructure	Ensures long-term infrastructure sustainability and resilience.

## 10. Economic Sustainability & Lifecycle Value

Credit ID	Sub-Credit	SDG	Goal Name	Alignment Explanation
ES-1*	Lifecycle Cost Analysis (LCCA)	SDG 9 & 12	Industry, Innovation and Infrastructure; Responsible Consumption and Production	Promotes long-term infrastructure planning through lifecycle cost optimisation and efficient use of financial and material resources.
ES-2	Green Finance & ESG Alignment	SDG 8, 9, & 17	Decent Work and Economic Growth; Industry, Innovation and Infrastructure; Partnerships for the Goals	Strengthens access to sustainable finance by aligning infrastructure projects with ESG frameworks and green finance mechanisms.
ES-3	Local Economic Benefits	SDG 8 & 11	Decent Work and Economic Growth; Sustainable Cities and Communities	Supports local economic development through MSME participation, employment generation, and skill development.

## Mandatory Credit Justification

**Note:** Mandatory credits define the minimum qualifying requirements within each impact category and do not carry any points. Failure to comply with any mandatory credit in a specific impact category will lead to disqualification from that category, irrespective of the total score achieved through point-based credits.

### 1. MR-1: Low-Carbon Materials

**Justification:**

Materials based on natural resources contribute highest embodied environmental impact in transportation projects. Use of low-carbon cementitious materials is a baseline sustainability requirement.

**Minimum Requirement:**

- Partial replacement of OPC with Fly ash / GGBS
- Compliance with applicable codes and standards

### 2. EC-1: Construction Energy Efficiency

**Justification:**

Energy intensive construction directly contributes to GHG emissions and air pollution. Basic energy efficiency is essential for responsible construction.

**Minimum Requirement:**

- Fuel-efficient equipment
- Idling control and maintenance practices

### 3. LE-1: Minimized Land Disturbance

**Justification:**

Linear transportation projects cause permanent land transformation. Alignment and ROW optimization is a non-negotiable sustainability baseline.

**Minimum Requirement:**

- Alignment justification
- Avoidance of sensitive ecological areas where feasible

### 4. WM-3: Water Quality Protection

**Justification:**

Protection of surface and groundwater from construction pollution is a regulatory and environmental necessity.

**Minimum Requirement:**

- Oil & grease traps

- Controlled discharge and pollution prevention measures

## **5. WE-1: Waste Management**

### **Justification:**

Improper disposal of construction waste leads to serious environmental and regulatory risks.

### **Minimum Requirement:**

- Waste segregation
- Authorized disposal or reuse

## **6. AQ-1: Dust Control**

### **Justification:**

Dust is the most immediate and visible impact of transportation construction on public health.

### **Minimum Requirement:**

- Regular water spraying
- Covered transport of fine materials

## **7. HS-1: Workers Safety**

### **Justification:**

Worker's safety is a fundamental ethical and legal requirement and cannot be traded for points.

### **Minimum Requirement:**

- PPE usage
- Safety training and toolbox talks

## **8. CS-1: Stakeholder Engagement**

### **Justification:**

Community engagement ensures social acceptance and conflict avoidance, which is critical for linear projects passing through populated areas.

### **Minimum Requirement:**

- Stakeholder consultation
- Grievance redressal mechanism

## **9. RC-1: Climate-Resilient Design**

### **Justification:**

Infrastructure must withstand future climate stresses to protect public investment.

### **Minimum Requirement:**

- Consideration of flooding, temperature, and rainfall risks in design

## 10. ES-1: Lifecycle Cost Analysis (LCCA)

### **Justification:**

Infrastructure projects involve significant capital investment and long-term operational expenditure. Adopting a Lifecycle Cost Analysis (LCCA) approach ensures informed decision-making by evaluating the total cost of ownership, including capital, operation, maintenance, and end-of-life costs. This promotes long-term infrastructure planning, financial efficiency, and optimal utilization of material and economic resources, while aligning with sustainable development principles.

### **Minimum Requirement:**

- Conduct a comprehensive Lifecycle Cost Analysis covering capital cost, operation cost, maintenance cost, replacement cost, and end-of-life considerations.
- Comparative evaluation of at least two design alternatives based on lifecycle cost performance.
- Documentation of assumptions, discount rates, service life, and cost data sources used in the analysis.
- Compliance with applicable national/international codes, standards, and recognized LCCA guidelines.

# DECARBONISED HABITAT ASSESSMENT & RATING FOR TRANSITION INITIATIVES - LINEAR INFRASTRUCTURE (DHARTI-LI 1.0)

## DHARTI Rating Council

Rating the built environment for a sustainable future

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Building Sustainable Transportation for a Resilient Future